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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/615,057 | 07/08/2003 | Tushar Prasad | 1789-11201 | 8027 |
| 23505 | 7590 | 08/22/2006 | EXAMINER | |
| CONLEY ROSE, P.C. P. O. BOX 3267 HOUSTON, TX 77253-3267 | | | GAKH, YELENA G | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1743 | |

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/615,057 | PRASAD ET AL. | |
| | Examiner | Art Unit | |
| | Yelena G. Gakh, Ph.D. | 1743 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 05 July 2006.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-10, 15 and 16 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-10, 15 and 16 is/are rejected.
 7) Claim(s) 5, 6 and 16 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 08 July 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>11/19/03</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

1. Election of claims 1-10 and 15-16 and amendment, which cancels claims 11-14 and adds claims 15-16, filed on 07/05/06, are acknowledged.

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

The examiner considers references cited in paragraph [0020] of the disclosure highly pertinent to the claimed invention and respectfully requests the applicants to submit the references for consideration.

Specification

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The specification is objected to as not containing "a written description of the invention ... in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains ... to make and use the same".

In particular, according to the Summary of Invention, "the present sensors exploit the superprism phenomenon, which causes a large deflection of a light beam in a photonic crystal when the incident angle of the light changes only slightly". From Detailed Description of the Preferred Embodiments it appears that creating such "superprism phenomenon" requires rigorous calculations including calculations of the band structure of the crystal, all possible values of

wave vectors in 3D space, dispersion surface, input-output characteristics of any input ray, propagation direction, the largest non-linear response for the input ray (i.e. the largest variation in the output), etc. Only then it is possible to position the light source 30 and crystal 10 such that the superprism effect of the crystal can be used to increase the sensitivity of the sensor in the composition of the solution. No particular calculations are provided in the Detailed Description or Examples, although “the results of these calculations are plotted [in] Figure 4” (page 8) (sic! “in” is missed from the sentence). It is not apparent, if the Applicants consider the calculations, which they just outlined in the specification, trivial. Moreover, it appears that the crystal can be used as a sensor only for a known analyte, when the analyte concentration changes.

The examiner considers the present specification inadequate to meet the enabling requirements for using photonic crystals as sensors the way it is claimed in the application.

Double Patenting

5. Applicant is advised that should claims 1-4 be found allowable, claims 7-10 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Objections

6. Claims 5 and 6 are objected to because of the following informalities: it appears that either the word “create” or “cause” should be deleted after “so as to” in the second line of the claims. Appropriate correction is required.

7. Claim 16 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 16 recites that the light sources are tuned. However, since most light sources are tunable, it does not further limit the structure of the parent claim.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 5-6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not provide any guidance for selecting photonic crystal and the light source and positioning them relative to each other to cause a displacement of the light beam of at least $2 \mu\text{m}$ when the refractive index of said photonic crystal changed by 0.002. Either specific calculations for possible photonic crystals and light sources and their position relative to each other had to be disclosed in the specification so as to give the guidance for the routineer in the art to obtain the sensor of claims 5 and 6, or specific photonic crystal and light source and their specific relative position should be recited in the claims to make them enabling.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-10 and 15-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites a light source “capable of illuminating the crystal”. Any light source is capable of illuminating the crystal, and any light source has a predetermined wavelength and direction. Therefore, it is not clear, which specific light source is meant in the claim. Is this the light source with a specific wavelength range? Is it any light source with any wavelength range?

Claims 5 and 6 are unclear and indefinite, since it is not apparent as to how it is possible to select the photonic crystal and the light source in such manner that the result of irradiation of the crystal by the light beam would have been predetermined the way it is recited in the claims?

From claim 7 it is completely unclear as to what is meant by the definition a “kit for making a photonic crystal”. There is a plurality of ways of making the photonic crystal, including drilling holes in the conventional crystal. Does the kit include chemicals or mechanical instruments to make the photonic crystal? The definition is completely unclear and ambiguous.

It is not clear as to what is the difference between claims 2-4 and 8-10, since it appears that the words “sensor” and “kit” have the same meaning in the context of the claims.

It is not clear, how the recitation of claim 16 further limits the structure of claim 15, since most light sources are tunable. It appears that the recitation of claim 16 is directed toward the method step, rather than structural limitation of the apparatus.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. **Claims 1 and 7** are rejected under 35 U.S.C. 102(b) as being anticipated by Koide (US 6,448,997).

Koide discloses a sensor, comprising a photonic crystal, a light source capable of illuminating the crystal with a light beam having a predetermined wavelength and direction, and a position sensing detector positioned so as to detect the position of the light beam after it is transmitted by the crystal (Abstract and Summary, col. 1-2). Since all structural elements meet the requirements for the sensor for detecting the presence of an analyte in a solution, Koide’s sensor is capable of detecting the presence of the analyte in the solution.

Claim Rejections - 35 USC § 103

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14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

17. **Claims 15-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koide.

While Koide does not specifically discloses an array of light sources with each light source having an associated position-sensing detector, it would have been obvious for any person of ordinary skill in the art to slightly modify Koide's scanning system by providing an array of light sources with associated position devices, since it may increase precision of scanning, because the deflection angle depends on the wavelength, and therefore scanning an object with different wavelengths allows increasing accuracy of the system.

18. **Claims 2-4 and 8-10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koide in view of Jiang et al. (US 6,929,764).

Koide does not specifically disclose the origin of the photonic crystal.

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Jiang discloses various monodisperse macroporous polymers, such as polystyrene (Figures 4A, 4B), and their ordered colloids used for preparing photonic crystals useful "in optical, micro-filtering and drug delivery applications" (Abstract) by removing colloidal template.

It would have been obvious for any person of ordinary skill in the art to use photonic crystals made as disclosed by Jiang in Koide's scanning system, because Jiang teaches a very convenient method for making various photonic crystals with controlled size and morphology of pores, which can increase the accuracy and precision of Koide's system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

8/17/06



YELENA GAKH
PRIMARY EXAMINER